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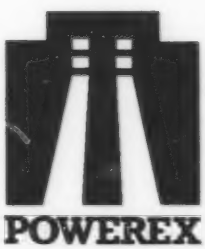

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EXECUTIVE SUMMARY

The October 1990 – September 1991 year of operation for the British Columbia Power Exchange Corporation (POWEREX) saw many events and challenges which continue to shape electricity trade policy and activity in the province.

POWEREX was established in 1988. The mandate that evolved in late 1988 and early 1989 was twofold: be the single-window agency for private sector development in the long term firm international electricity trade market; and market short term electricity products and services utilizing BC. Hydro's surplus capabilities. While POWEREX continued to devote attention to this mandate throughout the operating year, strong interest by the private sector to seek their own markets also led to a provincial energy policy shift in early 1991 which now accommodates that pursuit.

POWEREX continued to work with the original five shortlisted independent power producers (IPPs) in seeking long term electricity supply contracts in the international marketplace, particularly for the two B.C. IPPs shortlisted for the Sacramento Municipal Utilities District Request for Proposal (RFP). For other IPPs, POWEREX provides market, technical, and negotiating expertise on a fee-for-service basis. As Section 2.0 indicates, there has been increased activity in this sector of electricity trade.

A majority of the activity for POWEREX in 1990-91 focused on the renewal applications for existing provincial and federal short term energy export permits and licences. A comprehensive public involvement program on electricity trade was undertaken as part of these applications. POWEREX became involved in the U.S. regulatory arena through participation in the California Public Utilities Commission (CPUC) proceedings on behalf of Canadian Qualifying Facilities (QFs) to provide for increased access to the U.S. market. The participation prompted a POWEREX workshop to encourage B.C. IPPs to advance their interests in the international market and regulatory arena.

POWEREX has also endeavoured to expand and enhance the existing short term electricity trade market with the development of the Power Exchange Operation (PEO). Two symposiums were held on this initiative, with the aim of the second being to encourage membership and outline implementation. Following that conference, POWEREX submitted an application in September 1991 to the provincial Minister of Energy, Mines and Petroleum Resources seeking approval for its operation.

The 1990-91 operational year was busy with several coordination, transmission, and sales contracts negotiated by POWEREX. Details of the negotiations and a general sales summary are outlined in Section 3.0.

POWEREX facilitates electricity trade for the province through the surplus system capabilities offered by B.C. Hydro. The B.C. Hydro system is unique in its hydroelectric generation and transmission network operations. Section 4.0 illustrates how the two parties are able to balance the operating constraints with market opportunities to achieve mutual benefits.

Finally, Section 5.0 outlines the scope of electricity trade revenues during the operating year. As the figures indicate, POWEREX

worked to maximize the market opportunities and realized a gross margin for the operating year of $32 million dollars CDN, almost $1 million more than last year. These results reflect the success POWEREX has had in attaining its goal of maximizing the economic return on the B.C. Hydro system investment for the Province.

1.0 INTRODUCTION

In December of 1988 the B.C. Hydro Board of Directors, with the support of the B.C. Provincial Government, established POWEREX as a wholly-owned subsidiary of B.C. Hydro.

The POWEREX mission statement that evolved in late 1988 and early 1989 is to support British Columbia's economic growth by facilitating the development of private sector power industry for electricity trade.

The following objectives were adopted to support this mission:

◊ to enhance B.C. bulk power industry efficiency by facilitating short and long term competitive electricity trade,

◊ to cover all costs and provide a profit to B.C. Hydro when utilizing surplus B.C. Hydro system capabilities and B.C. Hydro facilities constructed for electricity trade,

◊ to provide electricity trade customers with an environmentally sound, competitively priced, reliable supply of electricity, and

◊ to be recognized by B.C. and trade participants as an innovative and effective electricity trade company.

POWEREX serves as a market-maker for the province's electricity generation producers, both in the long and short term international trade arena. In the long term area, POWEREX provides technical and market expertise to the private sector in their efforts to secure supply contracts in the interprovincial or international market. POWEREX has also applied to the government for the approval of the Power Exchange Operation (PEO). The PEO would facilitate the interaction of producers and customers in the short term electricity market. Trade currently exists in the international sector of this market, but the PEO would extend the opportunity and benefits to domestic producers and customers.

2.0 POWEREX HIGHLIGHTS

2.1 Regulatory Environment

The business activities and initiatives of POWEREX during the 1990-91 operating year were strongly influenced by the provincial, federal, and international regulatory and legislative arenas.

In January 1991, the Ministry of Energy, Mines and Petroleum Resources (MEMPR) formally announced that POWEREX would be changing its name from the British Columbia Power Export Corporation to the British Columbia Power Exchange Corporation, to reflect an expanded role that incorporates two-way electricity trade transactions.

At the same time, the provincial government also announced a change in the policy related to Independent Power Producers (IPPs) seeking long term export markets. IPPs would no longer be required to negotiate through POWEREX when marketing proposed

projects to utilities in the U.S. Previously, the policy required IPPs to first be shortlisted by POWEREX before submitting proposals to U.S. utilities. The result of this change has been a number of IPP proposals being submitted directly to U.S. utilities (e.g. Bonneville Power Administration [BPA] and Puget Sound Power & Light [Puget]) without any initial involvement by POWEREX. The IPPs must first ensure through POWEREX that wheeling and access to the market can be accommodated through the B.C. Hydro system.

In April 1991, B.C. Hydro and POWEREX submitted joint applications to the National Energy Board (NEB) and MEMPR to renew electricity trade export permits and Energy Removal Certificates (ERCs) for a six year term. The purpose of these applications was to obtain enabling approvals to allow the continuation of short term electricity trade, including export transactions under the PEO. B.C. Hydro and POWEREX are now waiting for a decision from both government bodies. Prior to submission of the applications, B.C. Hydro and POWEREX conducted a comprehensive public involvement program to provide information on electricity trade and identify and respond to issues raised by interested parties. A report on the public involvement process was submitted as part of the application.

As well, on 20 June 1991 the Provincial Government announced that the PEO would be designated as a Regulated Project under the Utilities Commission Act. POWEREX was directed to submit an application for an Energy Project Certificate (EPC) and an Energy Operation Certificate (EOC) to allow for a review and evaluation of the operation. The application was subsequently submitted to the provincial MEMPR in September 1991.

On the United States regulatory front, POWEREX has been participating in the California Public Utilities Commission (CPUC) proceedings, contending that Canadian resources which meet the same qualification criteria as U.S. resources should be able to compete in the same submission of resource acquisition bids to Investor Owned Utilities (IOUs). To qualify to submit bids, B.C. IPPs must meet the criteria for Qualifying Facilities (QFs) under the U.S. Public Utility Regulatory Policies Act (PURPA) legislation. QFs include high efficiency cogeneration projects and renewable resources (e.g. small hydro or geothermal).

POWEREX's involvement has focused on the Standard Offer 4 (SO-4) contract language under which IOUs purchase from QFs. This SO-4 contract is a standardized one used by IOUs to acquire resources from power producers for long term contracts. A number of changes were made necessary to allow purchases from Canadian resources. POWEREX was represented by consultants at a series of workshops in San Francisco dealing with these issues; B.C. IPPs have participated in the workshops as well.

In December 1990, the Western Systems Power Pool (WSPP) applied to the Federal Energy Regulatory Commission (FERC) for permanent status. The WSPP had been operating as an experiment since 1987. In June 1991 FERC, after considering the interventions, granted permanent status conditional on changes to the WSPP Agreement. The WSPP conformed to the FERC order in August 1991 and 37 utilities, including B.C. Hydro, signed the Conformed Agreement.

The Conformed or Permanent WSPP Agreement has an initial term of 10 years. The

ceiling prices for WSPP transactions were changed to cost-based prices and are significantly lower than the ceiling prices in the Experimental Agreement. As a result, the requirement for members to provide each other with long term transmission access was eliminated. The new agreement also allows IPPs, QFs, and power marketers to join the WSPP.

Finally, POWEREX continued to monitor the development of U.S. House and Senate energy bills that included provisions for mandatory transmission access.

2.2 POWEREX Marketing Activities

In facilitating a provincial electricity trade industry, POWEREX provides market and technical expertise to IPPs in their efforts to secure supply contracts.

2.2.1 Independent Power Producers (IPPs)

In response to the policy change by the provincial government in January 1991, several IPPs (including the original POWEREX shortlisted group) have been active during the past year in submitting proposals to U.S. utilities. Request for Proposal (RFP) activity occurred with the following companies:

◊ ***Bonneville Power Administration (BPA)***

There was a strong provincial response to BPA's RFP, which closed on 18 June 1991. A total of seven IPP proposals were submitted from B.C.

◊ ***Other Pacific Northwest (PNW) Utilities***

Other RFP's have been issued in the PNW area, including Montana Power Company (150 MW), Pacificorp (50 MW) and WWP (30 MW). These all have submission deadlines of late-1991 or early-1992.

2.2.2 Sacramento Municipal Utilities District (SMUD)

Two B.C. IPP projects were chosen among the final group selected under SMUD's RFP process. The 130 MW Crowsnest Cogeneration project is a proposed gas-fired plant located near the B.C.-Alberta Border which would be developed by TransAlta Resources (TAR) and Alberta Natural Gas (ANG). The 52 MW Houston Woodwaste project would be located near Houston, B.C. and would be developed by the Long Lake Energy Corporation in consortium with Destec Energy. Both projects have scheduled in-service dates for 1996-97. Both project proponents have signed a Memorandum of Understanding (MOU) with SMUD which outlines the principles for Power Sales Agreements. The terms of these agreements would be 25-30 years.

POWEREX has entered into an MOU with SMUD to provide services from the B.C. Hydro system to support the two IPP projects. The services comprise wheeling to the Canada-U.S. Border and storage/shaping of project output to enhance and give a value-added product. As well, POWEREX is assisting in the negotiations of long term transmission access through the BPA system to the California-Oregon Border. SMUD has set a deadline of 1 June 1992 for an interim status report on the progress of this agreement. Access through BPA is the major contractual contingency yet to be resolved for the sales to SMUD. In addition, all agreements are subject to obtaining the necessary regulatory approvals.

2.2.3 Los Angeles Department of Water & Power (LADWP)

In August 1990, POWEREX and The Power Alliance Corporation (T-PAC) submitted a proposal under the RFP issued by LADWP. The proposed project is a 220 MW combined cycle plant to be located near Savona, B.C. Although the proposal was selected to LADWP's initial shortlist, there was a subsequent change in LADWP's policy direction resulting in a heavier emphasis on conservation and local "in-basin" resources. As a result, the T-PAC project was dropped from further consideration by LADWP in early 1991.

2.3 Power Exchange Operation (PEO)

The PEO is a short term marketing initiative coordinated and operated by POWEREX. It is designed to facilitate short term trade among utilities, IPPs, cogenerators, bulk consumers and other players in the electricity market. The PEO currently conducts transactions in the interprovincial and international market; and with the provincial government's approval of the application for the PEO, intraprovincial trade could also commence.

The PEO utilizes interconnected utility electric systems and hydroelectric reservoirs to buy, sell, transmit, store and provide other electricity services. There has also been an increase in the availability of short term power from non-utility generators (NUGs), cogeneration operators and other utilities. This trend is expected to continue as advances in generation technology and fuels continue, and more players enter the electricity trade market. On the demand side, utilities and consumers have shown a desire to take advantage of the efficiencies afforded by this short term electricity market initiative.

All parties participating in bulk electricity trade in or with B.C. benefit from membership in the PEO. Benefits include access to a new and active short term electricity market for energy services and products at market prices, increased revenue for suppliers, and a more competitive and efficient electricity market for buyers.

POWEREX grants membership into the PEO at no charge to qualified electricity producers and consumers. PEO members must meet regulatory requirements as well as local system standards for safety, metering, tele-metering, system control, protection and communications facilities. Examples of such members include: IPPs, cogenerators, large consumers, and utilities. PEO members are classified as large (50 MW or greater) or small according to transaction capacity. Due to dispatching limitations, small members may only participate in block transactions of one month or longer.

2.4 Workshops

As a result of the ongoing activities in the regulatory and legislative arenas, POWEREX hosted two more workshops in 1991.

2.4.1 Power Exchange Operation Symposium

As a follow-up to the July 1990 PEO Symposium introducing the concept of the PEO, a second symposium was held by POWEREX on 17 May 1991 in Vancouver, B.C. The purpose was to provide information on the actual implementation of the PEO, invite membership, and launch the PEO. Over 130

participants attended representing Canadian and U.S. utilities, IPPs, bulk industrial customers, regulatory agencies, finance and business sectors, and public interest groups. The plenary session looked at the shift in the electricity sector towards open market access and the parallel between POWEREX initiatives and provincial energy policy. The subsequent participant workshops considered the technical operations and procedural material for actual implementation.

2.4.2 California Public Utilities Commission (CPUC)

On 24 July 1991, POWEREX hosted an IPP workshop in Vancouver, B.C. to discuss POWEREX's participation in the CPUC proceedings to develop the bidding process to be used by California Investor-Owned Utilities (IOUs) to acquire new resources.

Participation in this process will be significant for B.C. IPPs in that they will be permitted to compete in the request for bids by the three large IOUs in California, which represent 80% of the total electricity market in California. Based on current projections, it appears that the IOUs could be calling for bids to supply several hundred megawatts (MW) in late 1992.

As involvement in this U.S. regulatory process increases, POWEREX has been encouraging B.C. IPPs to consider forming an association to deal with issues of mutual interest, such as the CPUC process. The IPPs, not POWEREX, will be the main beneficiary of any changes which would allow Canadian QFs to compete in supplying IOU requirements in California. A few of the IPPs have indicated a willingness to initiate such an association.

2.5 Public Involvement

During the spring of 1991 POWEREX and B.C. Hydro conducted a public involvement program as part of their application to renew permits and licenses for the continued exchange and sale of short term electricity between B.C. Hydro, Alberta and the Western United States. The public involvement program was designed with the assistance of representative public interest groups. It provided opportunities for the public to express their views on the renewal applications.

POWEREX provided information to the public, including special interest groups representing the environment, industry and commerce, local and regional government and the general public. The project team had meetings and discussions with approximately 65 stakeholder groups.

Phase I of the POWEREX and B.C. Hydro public involvement program was program development, Phase II included open houses and consultative meetings and Phase III was a summary and analysis of the process.

This public involvement program helped to create a sense of awareness and understanding about how electricity trade is managed among utilities. The complex nature of electricity trade has stimulated ongoing requests for information and POWEREX continues to respond to these requests. A majority of the public agrees that electricity trade benefits British Columbia and that short term trade should continue.

3.0 ELECTRICITY TRADE ACTIVITIES

3.1 POWEREX Negotiations

POWEREX entered into negotiations with several parties in 1990 and 1991 in the areas of coordination, interconnections and sales.

3.1.1 Coordination

◊ ***Alberta Coordination***

Negotiations between POWEREX, B.C. Hydro and TransAlta Utilities Corporation (TAUC) led to a draft Principles of Agreement for coordination. These Principles are expected to be finalized and signed by the respective CEOs by late fall 1991.

By taking advantage of the diversity in the two systems, coordination will provide significant benefits to customers in both provinces. This will be realized through reductions in operating costs, increased interruptible and firm exchange revenues, deferral of plant additions, and the provision of system support in emergencies.

3.1.2 Interconnections

◊ ***Interconnection & Exchange Agreement (I & E)***

Negotiations between POWEREX, B.C. Hydro and the Bonneville Power Administration (BPA) led to the signing of an Interconnection and Exchange (I&E) Agreement in January 1991. An Amendatory Agreement to the I&E Agreement relating to transmission services was signed in August 1991.

It replaces one which expired 31 December 1990 and is focused on the principles of electricity exchanges and other services between the two regions. The new agreement runs until 2011.

Transfers will include emergency backup as well as exchanges and short-term electricity sales. The agreement will enable BPA to store energy in Canada, and will also establish guidelines for charges and the use of transmission lines.

◊ ***Washington Water Power (WWP) Intertie***

Discussions continued between POWEREX and WWP relating to a proposed new intertie. During the summer and fall of 1990, WWP attempted to market ownership participation in the remaining 800 MW of intertie capacity. However, WWP was unable to sign up any other utilities because the unit costs of the transmission were deemed to be too high.

Early in 1991, WWP advised that they were examining a lower cost initial stage for the intertie which would provide about 600–700 MW of transfer capability. Costs for the U.S. portion of the intertie would be significantly lower because an existing station in the Spokane area could be used, thus eliminating the requirement for series capacitors. The costs for B.C. Hydro's portion would also be significantly lower because less phase shifting transformer capacity would be required at the Selkirk substation. WWP also had discussions with IPPs in B.C. to develop an IPP component for the commercial transactions on the intertie.

Subsequently in April 1991, WWP advised that they had dropped the idea of ownership participation and were going to attempt to put together a package of 400 MW of capacity and 100-200 MW average firm energy from resources in B.C. and Alberta which WWP would try to market in the PNW.

◊ ***Puget Sound Power & Light (Puget) Intertie***

POWEREX initiated negotiations with Puget in March 1991 regarding the drafting of principles for an Interconnection & Exchange Agreement on the BPA/Puget Intertie Upgrade project.

These negotiations resulted from the BPA and Puget MOU agreed to in August 1990 which will increase the existing intertie transfer capability. Puget will receive 15 percent of the total capability and POWEREX will gain direct access to Puget for possible PEO and long term firm sales contracts.

3.2 Sales & Contracts

POWEREX facilitates two levels of short term electricity trade transactions - spot market sales, and negotiated contracts. All mill rates in Section 3.2 are expressed in U.S. currency.

3.2.1 Spot Market Summary

Due to a surplus situation in the PNW, the first quarter of 1990 (October to December) was marked with weak demand in the spot sales market. Only 5% of sales were conducted on a spot basis, of which the vast majority were sold to the Pacific SouthWest (PSW). Buy and sell spot prices were down to as low as 7 and 18 mills/kW.h respectively. By the first half of December 1990 POWEREX was completely shut out of the PSW market due to heavy loading on the PNW/PSW intertie. However, by mid-December 1990, a cold spell resulted in increased PNW demand and access to the PNW/PSW intertie was restored. At the end of the first quarter, buy and sell prices were 10 and 22/24 mills respectively. The price differential on the sell prices is determined by light load hours (LLH) and heavy load hours (HLH) respectively. HLH are, for example, the hours from 7:00 to 22:00 - Monday to Friday and 7:00 to 20:00 on Saturdays. LLH are all the other hours in the day and holidays.

The strong market that emerged in the latter part of December 1990 eased by 9 January 1991. A rise in seasonal temperatures led to surpluses in the PNW system which, in turn, lowered spot prices and limited POWEREX's access to PSW markets. Throughout January and February 1991, buy and sell prices changed little at 8 and 15 mills respectively. During the times when PSW access was available, POWEREX primarily marketed TAUC energy. By doing this, POWEREX was able to capture revenue through a profit-sharing arrangement with TAUC. By 12 March 1991, POWEREX stopped selling TAUC energy and concentrated on marketing its own energy. However, prices were lower due to the relatively high spill probability at Mica (MCA) and GM Shrum (GMS). Although buy prices remained reasonably stable at 7 mills, by the end of the second quarter (January to March) sell prices had dropped to 12.5 mills.

With the runoff volume forecast for the Columbia River Basin being close to average, BPA took the opportunity to market aggressively throughout the third quarter with few exceptions. Cooler weather from April to

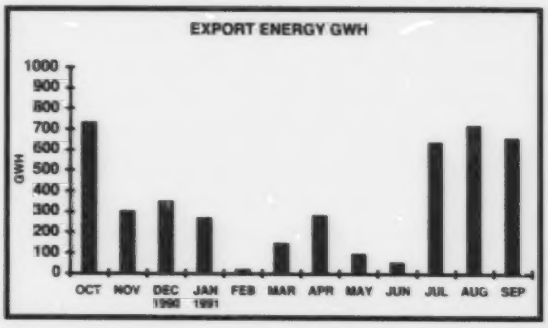
June 1991 provided some opportunities for POWEREX to conduct U.S. spot sales. However, during June 1991, a short term firm contract with WAPA was a main contributor to POWEREX's revenues. Spot prices remained soft during the entire quarter with an average sell price of only 12.44 mills.

At the start of the fourth quarter, due to the high spill probability at Mica/Revelstoke and Bridge River, POWEREX was aggressively marketing energy in an effort to reduce any potential system spill. However, market access was restricted as a result of BPA's non-firm sales activity and a scheduled Bellingham transformer maintenance outage. By the latter part of July 1991 this situation had changed and full access to the U.S. markets was realized. However, the demand for energy exports remained soft despite both Trojan and WNP-2 nuclear plants being out-of-service. The lack of demand in the PSW, as a result of cool seasonal temperatures, was identified as the primary cause of the soft market. POWEREX took advantage of this opportunity to maximize its storage return to BPA. This action minimized the requirement to sell energy at low market prices. By September 1991 this situation had changed and energy demand began to increase. Despite the limiting energy market conditions of July and August 1991, POWEREX's quarterly export sales volume (spot and negotiated contracts) reached 2,023 GW.h - the highest since 1988.

3.2.2 Negotiated Contracts

◊ ***Purchase From TAUC for BPA Sale***

In April 1991, negotiations commenced between BPA and POWEREX for a four year sale of energy to BPA. The Principles for this 100 MW average sale are in the final stage. The term of this agreement currently under discussion is from 1 December 1991 to 31 July 1995. The purchase price to be paid by BPA starts at 21 mills/kW.h in 1991 and escalates each year to 27 mills/kW.h in 1995. Each party will have an annual delivery curtailment allocation in hours which allows POWEREX to limit deliveries during winter peak hours. BPA is not required to take deliveries during spring runoff. The energy for this sale will be provided by TAUC.



The Principles for this Purchase Agreement from TAUC commenced in April 1991 and are still being discussed. The term of this agreement will be the same as the sale by POWEREX to BPA. TAUC will provide all the energy required for the BPA sale; 100 MW average plus energy losses in B.C. and Alberta. The net benefits of the BPA sale - the revenue from BPA (less generation costs and losses) - will be shared equally between POWEREX and TAUC.

◊ ***Portland General Electric (PGE) Sale***

An Agreement for a four year power sale to PGE was signed by POWEREX and PGE in

June 1991. This Agreement is under regulatory review. Initially, a six year term was contemplated but with the domestic supply uncertainty associated with the Kemano Completion Project in B.C., the term was reduced to four years.

The capacity and energy for this sale will be provided by resources that are surplus to the needs of B.C. Hydro. POWEREX will deliver the power to the B.C. Border and PGE will arrange firm wheeling across the BPA system.

The sale is for 200 MW of capacity year round with an additional 50 MW capacity during the morning peak. The energy is to be supplied at a 55% to 75% load factor.

◊ ***Washington Water Power (WWP) Capacity Sale***

In November 1990, POWEREX entered into a Capacity Sale Agreement with WWP for the period December 1990 to February 1991. The agreement was for 150 MW of capacity with an energy purchase option. WWP was responsible for arranging wheeling across the BPA system. WWP chose not to purchase any energy under this agreement.

◊ ***Prime-the-Pump Sales (PTP)***

PTP sales are defined as short term firm sales contracts with California utilities negotiated with firm transmission access through the Bonneville Power Administration - in essence "priming the pump" for future longer term firm access to California.

POWEREX negotiated PTP contracts with the following utilities:

a. Western Area Power Administration (WAPA) for a 50 MW supply with an 80% minimum load factor from 1 June to 31 August 1991.

b. San Diego Gas and Electric Company (SDG&E) for a 150 MW supply with a 60% minimum load factor from 1 July to 30 September 1991.

c. Pacific Gas & Electric Company (PG&E) for a 300 MW supply with an 80% minimum load factor from 1 July to 31 October 1991.

POWEREX arranged for transmission access from BPA to wheel this power from the B.C. Border to the California - Oregon Border. Intertie Condition 1 and 2 occurred frequently during June and July 1991 and during these times the only access to the California markets for POWEREX was through these PTP contracts. Condition 1 and 2 are two of the status levels given to transmission access on the PNW/PSW Intertie as part of the Long Term Intertie Access Policy (LTIAP). During Condition 1 and 2, Canadian resources do not have access over BPA and other PNW utilities unless the supply is firm.

4.0 POWEREX AND B.C. HYDRO

4.1 The B.C. Hydro System

4.1.1 POWEREX and B.C. Hydro Operating Agreement

As the B.C. Hydro subsidiary primarily responsible for electricity trade, POWEREX relies on the utility's integrated system to

facilitate trade and markets its surplus energy and capacity, as well as those from other producers. An Operating Agreement was developed between B.C. Hydro and POWEREX to govern this relationship. It is based on marginal cost pricing principles, which generally lead to a more efficient allocation of resources. Many other utilities besides B.C. Hydro use marginal cost information in decision support regarding energy sales and purchases, plant operations and other operating decisions.

This agreement is used to make purchase and sales decisions, but also forms the basis of a transfer pricing mechanism that fully compensates B.C. Hydro for both energy and services (such as storage and wheeling) so that the domestic operation is not compromised. POWEREX profits by the difference between the selling price and what it pays B.C. Hydro. These profits subsequently flow to B.C. Hydro because POWEREX is a wholly-owned subsidiary of B.C. Hydro.

4.1.2 Resource Availability

The B.C. Hydro system that POWEREX utilizes includes 9332 MW of hydroelectric generation geographically dispersed throughout the province. About one-third or 3116 MW is installed at two projects (G.M. Shrum and Peace Canyon) on the Peace River. In addition, 3579 MW is installed at two projects (Mica and Revelstoke) on the mainstream of the Columbia River. The remainder is located in other areas of the South Interior, the Lower Mainland and to a lesser degree on Vancouver Island. The hydroelectric generation is backed up by 912 MW of conventional thermal generation at the Burrard Thermal Generating Plant and 146 MW of gas turbines. Another contribution to the system includes energy purchases from domestic IPPs and other utilities.

This generation is interconnected with a transmission system that includes 5300 km of 500 kV lines, as well as an extensive network of lower voltage transmission lines comprising 8500 km of lines at a variety of voltages serving all areas of the province. As well, system interconnections with U.S. utilities and Alberta provide access to additional sources of energy for consumers; markets for the benefit of POWEREX, B.C. Hydro and the province; and a diversity of supply and market options.

The B.C. Hydro system is comprised of 94 percent hydroelectric generation. With huge reservoirs such as Williston and Kinbasket, there exists a large storage capability of 32 900 GW.h. There is a potential of up to 20 000 GW.h of summer storage available at times. As the information in the preceding Section 3.2 - Sales Summary detailed, B.C. Hydro operations are optimized through different seasons and changing weather conditions by the market information and activity generated by POWEREX. As a result, surplus electricity and capacity made available can be marketed.

4.2 System Maintenance and Reliability

4.2.1 Operations

Through the efficient management of the system, B.C. Hydro endeavours to reliably serve all firm domestic commitments and to generate surplus energy for POWEREX marketing initiatives. All existing hydroelectric resources are constantly being reviewed to identify opportunities for increasing their operating efficiency. This review includes raising reservoir operating

elevations, lowering tailwater elevations, increasing storage capabilities, revising operating rules and improving flood routing procedures. These improvements will not only delay the construction of new generating facilities, but also provide additional resources for POWEREX marketing initiatives. An example is the energy gain from surcharging the Kinbasket reservoir with water that would otherwise be spilled. The surcharge provided approximately 36 GW.h of additional energy for POWEREX markets. In return, POWEREX provides feedback to B.C. Hydro on power marketing benefits to influence the staging of new resources for increased system capacity. B.C. Hydro also schedules Burrard Thermal Generation using seasonal gas, swing gas and timely conversion of units from generating to synchronous mode to assist POWEREX's marketing capabilities (synchronous condenser mode is an operation where the generators are decoupled and serve to control voltage irregularities on the transmission lines). The potential of additional energy and capacity from the gas turbines at Prince Rupert is also being explored as a way to increase the system's energy capability for POWEREX.

A new maintenance outage program for major components has been initiated. This new program will work to generate a cost/benefit analysis for B.C. Hydro and POWEREX to influence the planning of maintenance outages. POWEREX's projected firm export capacities for the months of September, October and March 1991 were examples of data which assisted in the relocating of unit maintenance outages planned for those periods. As well, B.C. Hydro worked overtime to advance the repair of the lead shaft #2 at Mica when POWEREX required resources to meet its trade commitments.

To administrate the proper monitoring, verification, and billing quantities of future PEO transactions, a new facility has been installed to monitor the hourly power flows on the majority of ties with transmission voltage customers. A computer system "Telerate" has been selected to facilitate the communication of the PEO prices and quantities to the public.

4.2.2 Transmission

Several technological initiatives over the year were successful in achieving higher reliability and efficiency of the B.C. Hydro system. Together this resulted in increased marketing opportunities for POWEREX to trade with the U.S.

A remedial action scheme was installed in B.C. Hydro and BPA which allows for generator shedding at GM Shrum, Mica, and Revelstoke generating stations on loss of element(s) in the U.S. 500 kV Pacific AC Intertie when B.C. Hydro is trading with the PSW. This technology avoids B.C. Hydro export curtailments when generation in BPA is low.

The first B.C. Hydro phase shifter (230 kV, 400 MVA, +/- 40 degrees) was installed at the Nelway substation on 15 November 1990. This technology reduces circulating flows on the transmission network and associated losses in the B.C. Hydro system. It also assists in keeping the Ingledow to Custer tieline flow at or below 2000 MW.

Fault tests performed on the Metal Oxide Varistor (MOV) equipped 500 kV series capacitors at the American Creek capacitor station were successful. The MOV's improve the reliability of the series capacitors.

The B.C. Hydro transmission export limit on the BPA and B.C. Hydro tieline was raised from 2000 MW to 2300 MW on 29 August 1990. The first time that B.C. Hydro reached this export capability was on 14 December 1990.

On 14 November 1990, the Kelly Lake - Cheekeye 500 kV circuit was out-of-service for 14 days due to the loss of two transmission towers. This resulted in a restriction on export capability.

4.3 Business Development

As POWEREX is a wholly-owned subsidiary of B.C. Hydro, the two work together to develop policy and business development initiatives which mutually optimize the functions of each operation.

One of B.C. Hydro's initiatives is to develop, adopt, and recommend for implementation an integrated business plan/approach for the corporation. This framework, the Industrial Rate Proposal (IRP), would integrate the pricing of electricity products and services, planning, operations and marketing functions. The proposal was prepared and filed 20 January 1991 with the B.C. Utilities Commission (BCUC) as a component of the B.C. Hydro Rate Design Application. Its adoption and implementation will affect the business of POWEREX through the PEO, the Export and Domestic wheeling policies and the Standby Rates.

Currently, industrial rate customers purchase energy from B.C. Hydro or generate their own on-site source of supply. Under the provisions of the IRP, all customers would have the potential for multiple sources of supply, either from energy wheeled from another source, self/cogeneration, or energy purchases made through the PEO.

A special service and rate could be selected by the customer to match his production needs. In the case of the PEO, customers could secure supply from the marketplace as part of their alternate energy resource options.

In addition, the wheeling and standby options would be available to the customer who may select to utilize the services to shape and enhance electricity supply either being purchased from or sold through the various sources or the PEO.

The IRP will benefit and support both the POWEREX and B.C. Hydro initiatives by creating opportunities for electricity producers and consumers to have access to a short term market.

1990/91 Results Compared to Previous Operating Year *($ CDN millions)*		
	1990/91	**1989/90**
Contract Revenues	36	30
Interruptible Revenues	67	74
Total Revenues	**103**	**104**
Cost of Energy	71	73
Gross Margin	**32**	**31**

5.0 FINANCIAL REVIEW

POWEREX electricity trade revenues (gross of Wheeling charges) for the operating year to 30 September 1991, totalled $103 million, of which $67 million related to interruptible sales. While interruptible volumes were up about 22% over the previous year, the average price obtained went down from 30 to 22 mills, resulting in a $7 million reduction in revenues. The main reason for this was that water levels in the PNW were high, driving down market prices.

Contract revenues totaled $36 million for 1,100 GW.h (32 mills average). This was $6 million higher than the previous year, although the volumes sold were similar, as the average contract price was 2.5 mills higher.

The gross margin for the operating year, after deducting costs for energy and operations, was $32 million, about $1 million more than last year. During this time, a dividend of $25 million was paid to the parent company, B.C. Hydro, for the fiscal year ending 31 March 1991.